the groups identified by the Examiner were searched at one time, and such action is respectfully requested, MPEP 803.

Responsive to the species requirement made by the Examiner, applicant elects Species II corresponding to drawing Figure 3. Further responsive to the Examiner's requirement, the following is a listing of claims readable on the elected species. Claims 1-23, 28-32, 88-90 are readable on Fig. 3. Claims 1-23, 28-32 are generic to Figs. 1-3.

The following is responsive to the Examiner's request regarding the Information Disclosure Statement submitted May 6, 2002 citing the European Search Report in a Communication from the European Patent Office dated April 11, 2002. Enclosed as Exhibit A are the European-filed claims, namely EP claims 1-46. Enclosed as Exhibit B is a claim concordance list identifying which claims in the present U.S. application correspond to the noted EP claims. Enclosed as Exhibit C are amended European claims 1-46 following the noted Search Report.

Respectfully submitted,

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CLAIMS

1. A filtering system for filtering working fluid from a machine comprising a filter having a filter media element for filtering said working fluid, said filter having a first inlet receiving working fluid from said machine, said filter having a first outlet returning working fluid to said machine, said filter having a second inlet receiving a cleaning fluid from a source of cleaning fluid, said filter having a second outlet exhausting said cleaning fluid, said filter media element having a clean side communicating with said first outlet and said second inlet, said filter media element having a dirty side communicating with said first inlet and said second outlet, said filter having a first flowpath therethrough from said first inlet through said filter media element in one direction to said first outlet, said filter having a second flowpath therethrough from said second inlet through said filter media element in the opposite direction to said second outlet, said first and second flowpaths having common but opposite direction portions through said filter media element, said filter having a filtering mode of operation with said second inlet closed and said second outlet closed and filtering fluid flow therethrough along said first flowpath, said filter having a backwash mode of operation with said second inlet open and said second outlet open and said cleaning fluid flowing therethrough along said second flowpath and backwashing contaminant-laden working fluid from said dirty side of said filter media element to said second outlet, a contaminant separator having an inlet connected to said second outlet of said filter and receiving and separating contaminant from said contaminant-laden working fluid.

2. Filtering system according to claim 1 wherein said contaminant separator also stores said contaminant, said contaminant separator having an outlet discharging working fluid after separation of contaminant,
preferably, wherein said filtering system comprises a circulation system circulating working fluid to said machine, and wherein said outlet of said contaminant separator discharges working fluid to said circulation system,
further preferably, wherein said circulation system comprises a sump containing working fluid for said machine, and wherein said outlet of said contaminant separator discharges working fluid to said sump.

3. Filtering system according to claim 1 or 2 wherein said contaminant separator comprises a batch processor operative during said backwash mode of said filter and receiving said contaminant-laden working fluid from said second outlet of said filter and separating and storing contaminants, and passing working fluid.

4. Filtering system according to claim 3 wherein said filter is a continuous flow filter in said filtering mode, and said batch processor is a non-continuous flow centrifuge having a rotor driven during said backwash mode of said filter to separate said contaminants, said rotor being nondriven during said filtering mode of said filter.

5. Filtering system according to any one of the claims 1 to 4 wherein said contaminant separator comprises a centrifuge, particularly having a rotor separating contaminant from working fluid, and a storage container storing said contaminant,
preferably, wherein said centrifuge has a minimum capacity equal to the capacity of said stored contaminant plus the capacity of said filter,
further preferably, wherein said rotor includes an annular chamber providing said storage container.

6. Filtering system according to claim 5 wherein said rotor of said centrifuge is driven to rotate by a motive force, and wherein said motive force and said cleaning fluid are each provided by pressurized air,
preferably, wherein said source of cleaning fluid comprises a source of compressed air, and wherein the same said source of compressed air supplies both said motive force for said rotor and said cleaning fluid for said filter,
further preferably, comprising a first valve controlling the supply of pressurized air from said source of compressed air to said second inlet of said filter, and a second valve controlling the supply of pressurized air from said source of compressed air to said rotor of said centrifuge, said first and second valves operating such that said rotor begins spinning prior to introduction of contaminant-laden working fluid to said inlet of said centrifuge such that the centrifugal force of the already spinning rotor creates a hollow central air core in said contaminant-laden working fluid allowing escape of air.

7. Filtering system according to claim 5 or 6 wherein said storage container comprises a second filter media element reducing fluid turbulence particularly during rotor speed gradients at start-up and trapping contaminant particles and reducing particle re-entrainment during said rotor speed gradients,
preferably wherein said second filter media element comprises a matrix of filter material of at least 75% void volume,
further preferably wherein said void volume is at least 95%.

8. Filtering system according to claim 5 wherein said centrifuge comprises a housing having a rotor mounted for rotation therein about an axis, said rotor having an inner cylindrical sidewall with a hollow interior, and an outer cylindrical sidewall spaced radially outwardly of said inner cylindrical sidewall and defining an annular space therebetween, said inner cylindrical sidewall having a transfer passage therethrough providing communication of said hollow interior with said annular space, said housing having an inlet for admitting contaminant-laden fluid to said hollow interior of said inner cylindrical sidewall for passing through said transfer passage into said annular space for centrifugal separation upon said rotation, said annular space providing a storage container storing said contaminant,
preferably, wherein said rotor has a base plate extending between said inner and outer cylindrical sidewalls, said rotor base plate has a drain passage communicating with said annular space and effective upon stopping of said rotation to drain fluid therefrom, and wherein said centrifuge is a batch processor performing said separating function during rotation of said rotor and performing said draining function after rotation of said rotor when said rotor is stopped.

9. Filtering system according to claim 8 comprising high-loft filter media in said annular space comprising a matrix of filter material of at least 75% void volume, said annular space providing said storage container storing said contaminant and retaining said contaminant in said high-loft filter media, said high-loft filter media retaining and storing said separated contaminant in said annular space, including after said rotation when said rotor is stopped, said high-loft filter media reducing re-entrainment of said separated contaminant during start-up at the beginning of the next rotation of said rotor.

10. Filtering system according to claim 8 or 9 wherein said rotor outer cylindrical sidewall is removably separable from said base, and wherein said rotor further comprises a disposable liner shell capsule extending along and lining the interior of said outer cylindrical sidewall and accumulating and containing contaminant, such that said centrifuge may be serviced by removing said outer cylindrical sidewall and discarding said disposable liner shell capsule with contained contaminant therein and replacing same with another disposable liner shell capsule,

preferably, wherein said liner shell capsule further includes a base portion extending along and lining the interior of said rotor base plate, said drain passage being uncovered by said base portion of said liner shell capsule,

and/or, preferably, wherein said rotor outer cylindrical sidewall is a bell-shaped member, and said liner shell capsule is complementally bell-shaped along the interior thereof.

11. Filtering system according to claim 10 wherein said liner shell capsule defines said annular space therein, and comprising high-loft filter media in said liner shell capsule comprising a matrix of filter material of at least 75% void volume, said liner shell capsule providing said storage container storing said contaminant and retaining said contaminant in said high-loft filter media, said high-loft filter media retaining and storing said separated contaminant in said liner shell capsule, including after said rotation when said rotor is stopped, said high-loft filter media reducing re-entrainment of said separated contaminant during start-up at the beginning of the next rotation of said rotor, said liner shell capsule with said high-loft filter media therein being discarded upon servicing of said centrifuge, and replaced by another disposable liner shell capsule with fresh high-loft filter media therein.

12. Filtering system according to any one of the claims 5 to 11 wherein said centrifuge has a rotor centrifugally separating particulate contaminant from said working fluid by rotation of said rotor about an axis, said rotor having a turbine for causing rotation of said rotor in response to a pressurized gas jet motive force, said turbine having an inner ring on said rotor, a plurality of vanes extending radially outwardly to outer vane tips, and an outer ring at said outer vane tips, said outer ring blocking and containing deflected radially outward gas

flow from said vanes and confining said deflected gas flow to the radial gap between said inner and outer rings,

preferably, wherein said rotor is mounted in a housing having first and second inlets, and an outlet, said first inlet being a fluid inlet admitting contaminant-laden fluid for said centrifugal separation of said contaminant upon rotation of said rotor, said second inlet being a gas inlet admitting said pressurized motive force gas to cause rotation of said rotor, said outlet being both a gas and fluid outlet exhausting both said fluid after said separation and said motive force gas after driving said rotor,

further preferably, wherein said rotor has an inner cylindrical sidewall with a hollow interior, and an outer cylindrical sidewall spaced radially outwardly of said inner cylindrical sidewall and defining a first annular space therebetween, said housing has a cylindrical sidewall spaced radially outwardly of said rotor outer cylindrical sidewall and defining a second annular space therebetween, said rotor inner cylindrical sidewall has a transfer passage therethrough providing communication of said hollow interior with said first annular space, said turbine is in said second annular space, said rotor has a base plate with a drain passage communicating with said first annular space, said housing has a base plate having a first port communicating with said hollow interior and providing said fluid inlet for admitting contaminant-laden fluid from said second outlet of said cleanable filter to said hollow interior of said rotor inner cylindrical sidewall for passing through said transfer passage into said first annular space for centrifugal separation upon said rotation, said housing base plate has a second port communicating with said drain passage and said second annular space and providing said housing outlet exhausting said fluid from said first annular space through said drain passage and said gas from said second annular space.

13. Filtering system according to any one of the claims 5 to 12 wherein said centrifuge comprises a rotor mounted in a housing for rotation about an axis for centrifugally separating particulate contaminant from said contaminant-laden working fluid, said rotor having an inner cylindrical sidewall with a hollow interior, and an outer cylindrical sidewall spaced radially outwardly of said inner cylindrical sidewall and defining a first annular space therebetween, said housing having a cylindrical sidewall spaced radially outwardly of said rotor outer cylindrical sidewall and defining a second annular space therebetween, said rotor inner cylindrical sidewall having a transfer passage therethrough providing

communication of said hollow interior with said first annular space, said rotor having a base plate with a drain passage communicating with said first annular space, said rotor having a turbine for causing rotation of said rotor in response to a pressurized gas jet motive force, said housing having a base plate with first, second and third ports, said first port communicating with said hollow interior and being connected to said second outlet of said cleanable filter and providing a fluid inlet for admitting contaminant-laden fluid to said hollow interior of said rotor inner cylindrical sidewall for passing through said transfer passage into said first annular space for centrifugal separation, said second port communicating with said second annular space at said turbine for admitting pressurized gas for rotating said rotor, said third port communicating with said drain passage and said second annular space and exhausting both said fluid from said first annular space through said drain passage and said gas from said second annular space.

14. Filtering system according to any one of the claims 8 to 13 said system combining a cleanable filter and a centrifuge and transferring a contaminant storage function from said cleanable filter to said centrifuge, said centrifuge comprising a standpipe circumscribing said inner cylindrical sidewall and dividing said annular space into an inner annular chamber between said standpipe and said inner cylindrical sidewall, and an outer annular chamber between said standpipe and said outer cylindrical sidewall,

preferably, wherein said rotor has a base plate extending between said inner and outer cylindrical sidewalls, said rotor base plate has a drain passage communicating with said annular space and effective upon stopping of said rotation to drain fluid therefrom, said standpipe has an upper end at said transfer passage, and has a lower end at said drain passage, and wherein said contaminant-laden fluid comprises contaminant-laden liquid in a gas stream, and such that during rotation, gas in said gas stream from said transfer passage is vented through said inner annular chamber to said drain passage, and contaminant-laden liquid from said transfer passage is centrifically propelled into said outer annular chamber,

further preferably, comprising high-loft filter media in said outer annular chamber comprising a matrix of filter material of at least 75% void volume, said outer annular chamber providing a storage container storing said contaminant and retaining said contaminant in said high-loft filter media, said high-loft filter media retaining and storing said separated contaminant in said outer annular

chamber, including after said rotation when said rotor is stopped, said high-loft filter media reducing re-entrainment of said separated contaminant during start-up at the beginning of the next rotation of said rotor.

15. Filtering system according to any one of the claims 1 to 14 wherein said cleansing fluid is air, said contaminant-laden fluid contains both liquid and air, and said motive force pressurized gas is air.

16. In a filtering system for filtering working fluid from a machine where filter capacity is too low for a permanent filter yet flow rate is too high for a centrifuge, a combination employing the flow rate capability of a filter with the storage capacity capability of a centrifuge, comprising a cleanable filter having a filter media element for filtering said working fluid, said cleanable filter having a first inlet receiving working fluid from said machine, said cleanable filter having a first outlet returning working fluid to said machine, said cleanable filter having a second inlet receiving a cleaning fluid from a source of cleaning fluid, said cleanable filter having a second outlet exhausting said cleaning fluid, said filter media element having a clean side communicating with said first outlet and said second inlet, said filter media element having a dirty side communicating with said first inlet and said second outlet, said cleanable filter having a first flowpath therethrough from said first inlet through said filter media element in one direction to said first outlet, said cleanable filter having a second flowpath therethrough from said second inlet through said filter media element in the opposite direction to said second outlet, said first and second flowpaths having common but opposite direction portions through said filter media element, said cleanable filter having a filtering mode of operation with said second inlet closed and said second outlet closed and filtering fluid flow therethrough along said first flowpath, said cleanable filter having a backwash mode of operation with said second inlet open and said second outlet open and cleaning fluid flowing therethrough along said second flowpath and backwashing contaminant-laden working fluid from said dirty side of said filter media element to said second outlet, said centrifuge having an inlet connected to said second outlet of said cleanable filter, said centrifuge having a batch processing mode operative during said backwashing mode of said cleanable filter and receiving said contaminant-laden working fluid from said second outlet of said cleanable filter and separating and storing contaminant,

preferably, wherein said cleanable filter is a continuous flow filter in said filtering mode, and said centrifuge is a non-continuous flow batch processor having a rotor driven during said backwash mode of said cleanable filter and separating contaminant, said rotor being nondriven during said filtering mode of said cleanable filter.

17. Combination according to claim 16 comprising a plurality of said cleanable filters having respective said second outlets connected in parallel to said inlet of said centrifuge,
preferably, wherein said centrifuge has a plurality of batch processing modes operating serially sequentially, one mode for each of said cleanable filters.

18. A method for filtering working fluid from a machine comprising filtering said working fluid through a filter having a filter media element for filtering said working fluid, said filter having a first inlet receiving working fluid from said machine, said filter having a first outlet returning working fluid to said machine, said filter having a second inlet, supplying cleaning fluid to said second inlet from a source of cleaning fluid, said filter having a second outlet, said filter media element having a clean side communicating with said first outlet and said second inlet, said filter media element having a dirty side communicating with said first inlet and said second outlet, said filter having a first flowpath therethrough from said first inlet through said filter media element in one direction to said first outlet, said filter having a second flowpath therethrough from said second inlet to said filter media element in the opposite direction to said second outlet, said first and second flowpaths having common but opposite direction portions through said filter media element, exhausting said cleaning fluid and contaminant-laden working fluid from said second outlet, and separating contaminant from said contaminant-laden working fluid with a contaminant separator.

19. Method according to claim 18 comprising also storing said contaminant in said contaminant separator and discharging said fluid from said contaminant separator after separation of contaminant,
preferably, comprising circulating working fluid to said machine through a circulation system, and discharging working fluid from said contaminant separator to said circulation system,

further preferably, comprising providing a sump in said circulation system containing working fluid for said machine, and discharging working fluid from said contaminant separator to said sump.

20. Method according to claim 18 or 19 comprising providing said contaminant separator as a batch processor and operating said contaminant separator during said backwash mode of said filter such that said batch processor receives said contaminant-laden working fluid from said second outlet of said filter and separates and stores contaminant and passes working fluid.

21. Method according to claim 20 comprising providing said filter as a continuous flow filter in said filtering mode, and providing said batch processor as a non-continuous flow centrifuge, providing said centrifuge with a rotor and driving said rotor during said backwash mode of said filter to separate contaminants, and nondriving said rotor during said filtering mode of said filter.

22. Method according to any one of the claims 18 to 20 comprising providing said contaminant separator as a centrifuge having a rotor separating contaminant from working fluid and having a storage container storing said contaminant.

23. Method according to claim 22 comprising driving said rotor of said centrifuge by a motive force, and providing pressurized air as each of said motive force and said cleaning fluid,
preferably, comprising providing a source of compressed air as said source of cleaning fluid, and supplying said pressurized air from said source of compressed air as both said motive force for said rotor and said cleaning fluid for said filter,
further preferably, comprising controlling the supply of pressurized air from said source of compressed air to said second inlet of said filter and controlling the supply of pressurized air from said source of compressed air to said rotor of said centrifuge such that said rotor begins spinning prior to introduction of contaminant-laden working fluid to said inlet of said centrifuge such that the centrifugal force of the already spinning rotor creates a hollow central air core in said contaminant-laden working fluid allowing escape of air.

24. Method according to claim 22 or 23 comprising circulating working fluid to said machine through a circulation system, and discharging working fluid from said contaminant separator to said circulation system by gravity drain,
and/or, preferably, comprising circulating working fluid to said machine through a circulation system, and discharging working fluid from said contaminant separator to said circulation system by a delayed charge of pressurized air from said source of compressed air pressurizing said centrifuge following said separation.

25. Method according to any one of the claims 22 to 24 comprising reducing fluid turbulence in said centrifuge during rotor speed gradients at start-up, trapping contaminant particles and reducing particle re-entrainment during rotor speed gradients,
preferably, comprising reducing fluid turbulence in said centrifuge during rotor speed gradients at start-up, trapping contaminant particles and reducing particle re-entrainment during said rotor speed gradients by providing a second filter media element in said storage container,
further preferably, comprising providing said rotor with an annular chamber, and providing high-loft filter media comprising a matrix of filter material of at least 75% void volume as said second filter media element in said annular chamber in said rotor providing said storage container.

26. A method for utilizing the flow rate capability of a filter and the storage capacity capability of a centrifuge in a combined filtering system for filtering working fluid from a machine where filter capacity is too low for a permanent filter yet flow rate is too high for a centrifuge, comprising in combination providing a cleanable filter, providing a filter media element in said cleanable filter for filtering said working fluid, providing said cleanable filter with a first inlet receiving working fluid from a machine, providing said cleanable filter with a first outlet returning working fluid to said machine, providing said cleanable filter with a second inlet and supplying cleaning fluid to said second inlet from a source of cleaning fluid, providing said cleanable filter with a second outlet exhausting said cleaning fluid, providing said filter media element with a clean side communicating with said first outlet and said second inlet, providing said filter media element with a dirty side communicating with a said first inlet and said second outlet, providing said cleanable filter with a first flowpath

therethrough from said first inlet through said filter media element in one direction to said first outlet, providing said cleanable filter with a second flowpath therethrough from said second inlet through said filter media element in the opposite direction to said second outlet, providing said first and second flowpaths having common but opposite direction portions through said filter media element, providing said cleanable filter with a filtering mode of operation with said second inlet closed and said second outlet closed and filtering fluid flow therethrough along said first flowpath, providing said cleanable filter with a backwash mode of operation with said second inlet open and said second outlet open and said cleaning fluid flowing therethrough along said second flowpath and backwashing contaminant-laden working fluid from said dirty side of said filter media element to said second outlet, providing a centrifuge having an inlet and connecting said inlet of said centrifuge to said second outlet of said cleanable filter, operating said centrifuge in a batch processing mode during said backwashing mode of said cleanable filter and receiving said contaminant-laden working fluid from said second outlet of said cleanable filter and separating and storing contaminant,

preferably, comprising providing said cleanable filter as a continuous flow filter in said filtering mode, and providing said centrifuge as a non-continuous flow batch processor having a rotor, driving said rotor during said backwash mode of said cleanable filter to separate contaminant, and nondriving said rotor during said filtering mode of said cleanable filter.

27. Method according to claim 26 comprising providing a plurality of said cleanable filters having respective said second outlets, and connecting said second outlets in parallel to said inlet of said centrifuge,

preferably, comprising providing said centrifuge with a plurality of batch processing modes, and operating said batch processing modes serially sequentially, one mode for each of said cleanable filters.

28. A method of combining a cleanable filter and a centrifuge in a filtering system and transferring a contaminant storage function from said cleanable filter to said centrifuge, comprising providing a filter media element in said cleanable filter for filtering working fluid, providing said cleanable filter with a first inlet receiving working fluid from a machine, providing said cleanable filter with a first outlet returning working fluid to said machine, providing said cleanable

filter with a second inlet and supplying cleaning fluid to said second inlet from a source of cleaning fluid, providing said cleanable filter with a second outlet exhausting said cleaning fluid, providing said filter media element with a clean side communicating with said first outlet and said second inlet, providing said filter media element with a dirty side communicating with a said first inlet and said second outlet, providing said cleanable filter with a first flowpath therethrough from said first inlet through said filter media element in one direction to said first outlet, providing said cleanable filter with a second flowpath therethrough from said second inlet through said filter media element in the opposite direction to said second outlet, providing said first and second flowpaths having common but opposite direction portions through said filter media element, providing said cleanable filter with a filtering mode of operation with said second inlet closed and said second outlet closed and filtering fluid flow therethrough along said first flowpath, providing said cleanable filter with a backwash mode of operation with said second inlet open and said second outlet open and said cleaning fluid flowing therethrough along said second flowpath and backwashing contaminant-laden working fluid from said dirty side of said filter media element to said second outlet, providing said centrifuge with an inlet and connecting said inlet of said centrifuge to said second outlet of said cleanable filter and discharging contaminant-laden working fluid from said second outlet of said cleanable filter to said inlet of said centrifuge and separating and storing contaminant in said centrifuge,

preferably, comprising providing said centrifuge with a housing having a rotor mounted for rotation therein about an axis, providing said rotor with an inner cylindrical sidewall with a hollow interior, and an outer cylindrical sidewall spaced radially outwardly of said inner cylindrical sidewall and defining an annular space therebetween, providing said inner cylindrical sidewall with a transfer passage therethrough providing communication of said hollow interior with said annular space, providing said housing with an inlet for admitting contaminant-laden fluid to said hollow interior of said inner cylindrical sidewall for passing through said transfer passage into said annular space for centrifugal separation upon said rotation, said annular space providing a storage container storing said contaminant, providing said rotor with a base plate extending between said inner and outer cylindrical sidewalls, providing said rotor base plate with a drain passage communicating with said annular space and effective upon stopping of said rotation to drain fluid therefrom, operating said centrifuge

as a batch processor and performing said separating function during rotation of said rotor and performing said draining function after rotation of said rotor when said rotor is stopped.

29. Method according to claim 28 comprising providing high-loft filter media in said annular space comprising a matrix of filter material of at least 75% void volume, said annular space providing said storage container storing said contaminant and retaining said contaminant in said high-loft filter media, said high-loft filter media retaining and storing said separated contaminant in said annular space, including after said rotation when said rotor is stopped, said high-loft filter media reducing re-entrainment of said separated contaminant during start-up at the beginning of the next rotation of said rotor.

30. Method according to claim 28 comprising providing said rotor outer cylindrical sidewall removably separable from said base plate, providing a disposable liner shell capsule extending along and lining the interior of said outer cylindrical sidewall and accumulating and containing contaminant, servicing said centrifuge by removing said outer cylindrical sidewall and then discarding said disposable liner shell capsule with contained contaminant therein and then replacing same with another disposable liner shell capsule,
preferably, wherein said disposable liner shell capsule defines said annular space therein, and comprising providing high-loft filter media in said disposable liner shell capsule comprising a matrix of filter material of at least 75% void volume, said annular space providing said storage container storing said contaminant and retaining said contaminant in said high-loft filter media, said high-loft filter media retaining and storing said separated contaminant in said annular space, including after said rotation when said rotor is stopped, said high-loft filter media reducing re-entrainment of said separated contaminant during start-up at the beginning of the next rotation of said rotor, and servicing said centrifuge by removing and discarding said disposable liner shell capsule with said high-loft filter media therein and replacing same by another disposable liner shell capsule with fresh high-loft filter media therein.

31. Method according to claim 28, providing a standpipe circumscribing said inner cylindrical sidewall and dividing said annular space into an inner annular chamber between said standpipe and said inner cylindrical sidewall, and an outer

annular chamber between said standpipe and said outer cylindrical sidewall, providing said standpipe with an upper end at said transfer passage, providing said standpipe with a lower end having one or more openings at said drain passage, said fluid containing contaminant-laden liquid in a gas stream, and during rotation, venting gas from said transfer passage through said inner annular chamber to said drain passage, and centrifically propelling contaminant-laden liquid from said transfer passage into said outer annular chamber, and upon stopping of said rotation, draining liquid from said outer annular chamber through said one or more openings at said lower end of said standpipe to said drain passage,

preferably, comprising providing high-loft filter media in said outer annular chamber comprising a matrix of filter material of at least 75% void volume, said outer annular chamber providing said storage container storing said contaminant and retaining said contaminant in said high-loft filter media, said high-loft filter media retaining and storing said separated contaminant in said outer annular chamber, including after said rotation when said rotor is stopped, said high-loft filter media reducing re-entrainment of said separated contaminant during start-up at the beginning of the next rotation of said rotor.

32. A centrifuge for separating particulate contaminant from a contaminant-laden fluid, comprising a housing having a rotor mounted for rotation therein about an axis, said rotor having an inner cylindrical sidewall with a hollow interior, and an outer cylindrical sidewall spaced radially outwardly of said inner cylindrical sidewall and defining an annular space therebetween, said inner cylindrical sidewall having a transfer passage therethrough providing communication of said hollow interior with said annular space.

33. Centrifuge according to claim 32, comprising high-loft filter media in said annular space, said high-loft filter media comprising a matrix of filter material of at least 75% void volume,

preferably, said housing having an inlet for admitting contaminant-laden fluid to said hollow interior of said inner cylindrical sidewall for passing through said transfer passage into said annular space for centrifugal separation upon said rotation,

further preferably, said annular space providing a storage container storing said contaminant and particularly retaining said contaminant in said high-loft filter media.

34. Centrifuge according to claim 33 wherein said matrix of filter material of said high-loft filter media is selected from the group consisting of: fibrous material; polyester; foam, including reticulated foam; spun bonded web; wire mesh, including stainless steel; and sintered material, including porous composites.

35. Centrifuge according to claim 33 or 34 wherein said rotor has a base plate extending between said inner and outer cylindrical sidewalls, said rotor base plate having a drain passage communicating with said annular space and effective upon stopping of said rotation to drain fluid therefrom,
preferably, wherein said centrifuge is a batch processor performing said separating function during rotation of said rotor, and performing said draining function after rotation of said rotor when said rotor is stopped, wherein said high-loft filter media retains and stores said separated contaminant in said annular space, including after said rotation when said rotor is stopped, and wherein said high-loft filter media reduces re-entrainment of said separated contaminant during start-up at the beginning of the next rotation of said rotor.

36. Centrifuge according to claim 35 wherein said rotor base plate has a configured surface facing said annular space and gravitationally guiding drainage of fluid therefrom to said drain passage upon said stopping of rotation,
preferably, wherein said configured surface has an upper-height outer portion adjacent said outer cylindrical sidewall, a lower pocket portion, and an intermediate-height inner portion adjacent said inner cylindrical sidewall, said configured surface being tapered radially inwardly and downwardly from said upper-height outer portion to said lower pocket portion and then upwardly to said intermediate-height inner portion, said upper-height outer portion having a height higher than said intermediate-height inner portion, said intermediate-height inner portion having a height greater than said lower pocket portion, said drain passage being at said intermediate-height inner portion, such that separated contaminant not retained by said high-loft filter media is collected in said lower pocket

portion, and fluid above said collected contaminant in said lower pocket portion drains to said drain passage,
further preferably, wherein said rotor rotates about a central shaft, and wherein said drain passage is between said central shaft and said rotor base plate.

37. Centrifuge according to any one of the claims 33 to 36, said outer cylindrical sidewall being removably separable from said base plate, said rotor further having a disposable liner shell capsule extending along and lining the interior of said outer cylindrical sidewall and accumulating and containing contaminant in said annular space, such that said centrifuge may be serviced by removing said outer cylindrical sidewall and then discarding said disposable liner shell capsule with contained contaminant therein and replacing same with another disposable liner shell capsule, said disposable liner shell capsule defining said annular space therein, high-loft filter media in said disposable liner shell capsule comprising a matrix of filter material of at least 75% void volume, said annular space providing said storage container storing said contaminant and retaining said contaminant in said high-loft filter media, said high-loft filter media retaining and storing said separated contaminant in said annular space, including after said rotation when said rotor is stopped, said high-loft filter media reducing re-entrainment of said separated contaminant during start-up at the beginning of the next rotation of said rotor, said disposable liner shell capsule with said high-loft filter media therein being discarded upon servicing of said centrifuge, and replaced by another disposable liner shell capsule with fresh high-loft filter media therein,
preferably, wherein said liner shell capsule further includes a base portion extending along and lining the interior of said rotor base plate, said drain passage being uncovered by said base portion of said liner shell capsule,
and/or, preferably, wherein said outer cylindrical sidewall is a bell-shaped member, and said liner shell capsule is complementally bell-shaped along the interior thereof.

38. Centrifuge according to claim 32, wherein said contaminant-laden fluid comprises contaminant-laden liquid in a gas stream, said housing having an inlet for admitting said contaminant-laden liquid in said gas stream to said hollow interior of said inner cylindrical sidewall for passing through said transfer passage into said annular space for centrifugal separation upon said rotation, said

rotor having a drain passage communicating with said annular space and effective upon stopping of said rotation to drain fluid therefrom, a standpipe circumscribing said inner cylindrical sidewall and dividing said annular space into an inner annular chamber between said standpipe and said inner cylindrical sidewall, and an outer annular chamber between said standpipe and said outer cylindrical sidewall, said standpipe having an upper end at said transfer passage, and having a lower end at said drain passage, such that during rotation, gas from said transfer passage is vented through said inner annular chamber to said drain passage, and contaminant-laden liquid from said transfer passage is centrifically propelled into said outer annular chamber,

preferably, wherein said standpipe has an upper reach at said upper end at a level vertically below said transfer passage,

and/or, preferably, wherein said standpipe has one or more openings at said lower end draining fluid therethrough from said outer annular chamber to said drain passage upon said stopping of said rotation,

further preferably, wherein said standpipe is perforated with a plurality of holes at said lower end covered with a ring of filter material.

39. Centrifuge according to claim 38 wherein said rotor has a base plate extending between said inner and outer cylindrical walls, said rotor base plate has a configured surface facing said annular space and gravitationally guiding drainage of liquid therefrom to said drain passage upon said stopping of rotation, and wherein said standpipe at said lower end is mounted to said rotor base plate at said configured surface,

preferably, wherein said configured surface has an upper-height outer portion adjacent said outer cylindrical sidewall, a lower pocket portion, and an intermediate-height inner portion adjacent said inner cylindrical sidewall, said configured surface being tapered radially inwardly and downwardly from said upper-height outer portion to said lower pocket portion and then upwardly to said intermediate-height inner portion, said upper-height outer portion having a height higher than said intermediate-height inner portion, said intermediate-height inner portion having a height greater than said lower pocket portion, said drain passage being at said intermediate-height inner portion, such that separated contaminant is collected in said lower pocket portion, and liquid above said collected contaminant in said lower pocket portion drains to said drain passage,

further preferably, wherein said rotor rotates about a central shaft, and wherein said drain passage is between said central shaft and said rotor base plate.

40. Centrifuge according to claim 38 wherein said outer annular chamber has high-loft filter media therein comprising a matrix of filter material of at least 75% void volume, and wherein said inner annular chamber is left open without filter material therein to facilitate high volumetric flow of said gas therethrough to escape from said rotor quickly and with low pressure drop.

41. Centrifuge according to any one of the claims 38 to 40 further comprising in combination a turbine for causing rotation of said rotor in response to a pressurized gas jet motive force, said turbine having an inner ring on said rotor, a plurality of vanes extending radially outwardly to outer vane tips, and an outer ring at said outer vane tips, said outer ring containing and blocking deflected radially outward gas flow from said vanes and confining said deflected gas flow to the radial gap between said inner and outer rings,
preferably, wherein said gas of said pressurized gas jet motive force and said gas of said gas stream are the same.

42. A centrifuge having a rotor mounted in a housing for rotation about an axis for centrifugally separating particulate contaminant from a contaminant-laden fluid, said rotor having an inner cylindrical sidewall with a hollow interior, and an outer cylindrical sidewall spaced radially outwardly of said inner cylindrical sidewall and defining a first annular space therebetween, said housing having a cylindrical sidewall spaced radially outwardly of said rotor outer cylindrical sidewall and defining a second annular space therebetween, said rotor inner cylindrical sidewall having a transfer passage therethrough providing communication of said hollow interior with said first annular space, said rotor having a base plate extending between said inner and outer cylindrical sidewalls and having a drain passage communicating with said first annular space, said rotor having a turbine in said second annular space for causing rotation of said rotor, said housing having a base plate with first, second and third ports, said first port communicating with said hollow interior of said rotor inner cylindrical sidewall and providing an inlet for contaminant-laden fluid for admitting contaminant-laden fluid to said hollow interior of said rotor inner cylindrical sidewall for passing through said transfer passage into said first annular space for

centrifugal separation upon said rotation, said second port providing a pressurized gas jet motive force inlet communicating with said second annular space at said turbine for causing rotation of said rotor, said third port communicating with said drain passage and said second annular space and providing an outlet exhausting both said fluid from said first annular space through said drain passage and said gas from said second annular space,

preferably, wherein said contaminant-laden fluid contains both liquid and gas,

and/or, preferably, wherein said gas of said motive force gas and said gas of said contaminant-laden fluid are the same.

43. A centrifuge having a rotor centrifugally separating particulate contaminant from a contaminant-laden fluid by rotation of said rotor about an axis, a turbine for causing rotation of said rotor in response to a pressurized gas jet motive force,

preferably said turbine having an inner ring on said rotor, a plurality of vanes extending radially outwardly to outer vane tips, and an outer ring at said outer vane tips, said outer ring containing and blocking deflected radially outward gas flow from said vanes and confining said deflected gas flow to the radial gap between said inner and outer rings,

further preferably, wherein said rotor is mounted in a housing having first and second inlets, and an outlet, said first inlet being a fluid inlet admitting contaminant-laden fluid for said centrifugal separation of said contaminant upon said rotation of said rotor, said second inlet being a gas inlet admitting said pressurized motive force gas to cause rotation of said rotor, said outlet being both a gas and fluid outlet exhausting both said fluid after said separation and said motive force gas,

further preferably, wherein said rotor has an inner cylindrical sidewall with a hollow interior, and an outer cylindrical sidewall spaced radially outwardly of said inner cylindrical sidewall and defining a first annular space therebetween, said housing has a cylindrical sidewall spaced radially outwardly of said rotor outer cylindrical sidewall and defining a second annular space therebetween, said rotor inner cylindrical sidewall has a transfer passage therethrough providing communication of said hollow interior with said first annular space, said turbine is in said second annular space, said rotor has a base plate with a drain passage communicating with said first annular space, said housing has a base plate with an inlet port communicating with said hollow interior of said inner cylindrical

sidewall of said rotor and providing said fluid inlet for admitting contaminant-laden fluid to said hollow interior of said rotor inner cylindrical sidewall for passing through said transfer passage into said first annular space for centrifugal separation upon said rotation, said housing base plate having an outlet port communicating with said drain passage and said second annular space and providing said outlet exhausting said fluid from said first annular space through said drain passage and said gas from said second annular space,
further preferably, wherein said housing base plate has a second inlet port communicating with said turbine in said second annular space and providing said gas inlet.

44. Centrifuge according to claim 43 wherein said contaminant-laden fluid comprises contaminant-laden liquid in a gas stream.

45. Centrifuge according to claim 43 or 44 comprising a standpipe circumscribing said inner cylindrical sidewall and dividing said first annular space into an inner annular chamber between said standpipe and said rotor inner cylindrical sidewall, and an outer annular chamber between said standpipe and said rotor outer cylindrical sidewall, said standpipe having an upper end at said transfer passage, and having a lower end at said drain passage, such that during rotation, gas from said gas stream from said transfer passage is vented through said inner annular chamber to said drain passage, and contaminant-laden liquid from said transfer passage is centrifically propelled into said outer annular chamber.

46. Centrifuge according to claim 45 wherein said outer annular chamber has high-loft filter media therein comprising a matrix of filter material of at least 75% void volume, and wherein said inner annular chamber and said second annular space are left open without filter material therein.

Concordance List

US Claims	EP Claims	US Claims	EP Claims
1	1	30	12, second option
2	2	31	13
3	2, first option	32	15
4	2, second option	33	18
5	3	34	19
6	4	35	19, first option
7	5	36	19, second option
8	6	37	20
9	6, first option	38	21
10	7	39	22
11	7, first option	40	23
12	7, second option	41	23, first option
13	5, first option	42	24
14	5, second option	43	24, option
15	6, second option	44	25
16	16	45	25, first option
17	16, option	46	25, second option
18	17	47	23, second option
19	17, first option	48	26
20	5	49	26, first option
21	8	50	27
22	8, option	51	27, option
23	9	52	28
24	10	53	28, option
25	10, first option	54	29
26	10, second option	55	30
27	11	56	30, option
28	12	57	32 + 33
29	12, first option	58	34

59	35	88	14
60	35, option	89	14, first option
61	36	90	14, second option
62	36, first option	91	10
63	36, second option	92	31
64	43 + 43, first option	93	31, option
65	43, second option		
66	43, third option		
67	43, fourth option		
68	42		
69	42, first option		
70	42, second option		
71	37		
72	37, first option		
73	37, second option		
74	38		
75	38, first option		
76	38, second option		
77	38, third option		
78	39		
79	39, first option		
80	39, second option		
81	40		
82	41		
83	41, option		
84	44		
85	43, second option		
86	45		
87	46		

CLAIMS

1. A filtering system for filtering working fluid from a machine (12) comprising a filter (16) having a filter media element (30) for filtering said working fluid, said filter (16) having a first inlet (24) receiving working fluid from said machine (12), said filter (16) having a first outlet (26) returning working fluid to said machine (12), said filter having a second inlet (52) receiving a cleaning fluid from a source of cleaning fluid, said filter (16) having a second outlet (56) exhausting said cleaning fluid, said filter media element (30) having a clean side (34) communicating with said first outlet (26) and said second inlet (52), said filter media element (30) having a dirty side (32) communicating with said first inlet (24) and said second outlet (56), said filter (16) having a first flowpath therethrough from said first inlet (24) through said filter media element (30) in one direction to said first outlet (26), said filter (16) having a second flowpath therethrough from said second inlet (52) through said filter media element (30) in the opposite direction to said second outlet (56), said first and second flowpaths having common but opposite direction portions through said filter media element (30), said filter (16) having a filtering mode of operation with said second inlet (52) closed and said second outlet (56) closed and filtering fluid flow therethrough along said first flowpath, said filter (16) having a backwash mode of operation with said second inlet (52) open and said second outlet (56) open and said cleaning fluid flowing therethrough along said second flowpath and backwashing contaminant-laden working fluid from said dirty side (32) of said filter media element (30) to said second outlet (56), a contaminant separator (82) having an inlet (84) connected to said second outlet (56) of said filter (16) and receiving and separating contaminant from said contaminant-laden working fluid.

2. Filtering system according to claim 1 wherein said contaminant separator (82) also stores said contaminant, said contaminant separator (82) having an outlet (92) discharging working fluid after separation of contaminant,
preferably, wherein said filtering system comprises a circulation system circulating working fluid to said machine (12), and wherein said outlet (92) of said contaminant separator (82) discharges working fluid to said circulation system,
further preferably, wherein said circulation system comprises a sump (14) containing working fluid for said machine (12), and wherein said outlet (92) of said contaminant separator (82) discharges working fluid to said sump (14).

3. Filtering system according to claim 1 or 2 wherein said contaminant separator (82) comprises a batch processor operative during said backwash mode of said filter (16) and receiving said contaminant-laden working fluid from said second outlet (56) of said filter (16) and separating and storing contaminants, and passing working fluid.

4. Filtering system according to claim 3 wherein said filter (16) is a continuous flow filter in said filtering mode, and said batch processor is a non-continuous flow centrifuge (82) having a rotor (96) driven during said backwash mode of said filter (16) to separate said contaminants, said rotor (96) being nondriven during said filtering mode of said filter (16).

5. Filtering system according to any one of the claims 1 to 4 wherein said contaminant separator (82) comprises a centrifuge having a rotor (96) separating contaminant from working fluid, and a storage container storing said contaminant,
preferably, wherein said centrifuge (82) has a minimum capacity equal to the capacity of said stored contaminant plus the capacity of said filter (16),
further preferably, wherein said rotor (96) includes an annular chamber (108) providing said storage container.

6. Filtering system according to claim 5 wherein said rotor (96) of said centrifuge (82) is driven to rotate by a motive force, and wherein said motive force and said cleaning fluid are each provided by pressurized air,
preferably, wherein said source of cleaning fluid comprises a source of compressed air (71), and wherein the same said source of compressed air supplies both said motive force for said rotor (96) and said cleaning fluid for said filter (16),
further preferably, comprising a first valve (138) controlling the supply of pressurized air from said source of compressed air (71) to said second inlet (52) of said filter (16), and a second valve (134) controlling the supply of pressurized air from said source of compressed air (71) to said rotor (96) of said centrifuge (82), said first and second valves (134, 138) operating such that said rotor (96) begins spinning prior to introduction of contaminant-laden working fluid to said inlet (84) of said centrifuge (82) such that the centrifugal force of the already

spinning rotor (96) creates a hollow central air core in said contaminant-laden working fluid allowing escape of air.

7. Filtering system according to claim 5 or 6 wherein said storage container comprises a second filter media element (148) reducing fluid turbulence particularly during rotor speed gradients at start-up and trapping contaminant particles and reducing particle re-entrainment during said rotor speed gradients, preferably wherein said second filter media element (148) comprises a matrix of filter material of at least 75% void volume,
further preferably wherein said void volume is at least 95%.

8. Filtering system according to claim 5 wherein said centrifuge (82) comprises a housing (98) having a rotor (96) mounted for rotation therein about an axis (100), said rotor (96) having an inner cylindrical sidewall (102) with a hollow interior (104), and an outer cylindrical sidewall (106) spaced radially outwardly of said inner cylindrical sidewall (102) and defining an annular space (108) therebetween, said inner cylindrical sidewall (102) having a transfer passage (146) therethrough providing communication of said hollow interior (104) with said annular space (108), said housing (98) having an inlet (84) for admitting contaminant-laden fluid to said hollow interior (104) of said inner cylindrical sidewall (102) for passing through said transfer passage (146) into said annular space (108) for centrifugal separation upon said rotation, said annular space (108) providing a storage container storing said contaminant,
preferably, wherein said rotor (96) has a base plate (110) extending between said inner and outer cylindrical sidewalls (102, 106), said rotor base plate (110) has a drain passage (111) communicating with said annular space (108) and effective upon stopping of said rotation to drain fluid therefrom, and wherein said centrifuge (82) is a batch processor performing said separating function during rotation of said rotor (96) and performing said draining function after rotation of said rotor (96) when said rotor (96) is stopped.

9. Filtering system according to claim 8 comprising high-loft filter media (148) in said annular space (108) comprising a matrix of filter material of at least 75% void volume, said annular space (108) providing said storage container storing said contaminant and retaining said contaminant in said high-loft filter media (148), said high-loft filter media (148) retaining and storing said separated contaminant in said annular space (108), including after said rotation when said

rotor (96) is stopped, said high-loft filter media (148) reducing re-entrainment of said separated contaminant during start-up at the beginning of the next rotation of said rotor (96).

10. Filtering system according to claim 8 or 9 wherein said rotor (96) outer cylindrical sidewall (106) is removably separable from said base, and wherein said rotor (96) further comprises a disposable liner shell capsule (170) extending along and lining the interior of said outer cylindrical sidewall (106) and accumulating and containing contaminant, such that said centrifuge (82) may be serviced by removing said outer cylindrical sidewall (106) and discarding said disposable liner shell capsule (170) with contained contaminant therein and replacing same with another disposable liner shell capsule (170),
preferably, wherein said liner shell capsule (170) further includes a base portion (174) extending along and lining the interior of said rotor base plate (110), said drain passage (111) being uncovered by said base portion (174) of said liner shell capsule (170),
and/or, preferably, wherein said rotor outer cylindrical sidewall (106) is a bell-shaped member, and said liner shell capsule (170) is complementally bell-shaped along the interior thereof.

11. Filtering system according to claim 10 wherein said liner shell capsule (170) defines said annular space (108) therein, and comprising high-loft filter media (148) in said liner shell capsule (170) comprising a matrix of filter material of at least 75% void volume, said liner shell capsule (170) providing said storage container storing said contaminant and retaining said contaminant in said high-loft filter media (148), said high-loft filter media (148) retaining and storing said separated contaminant in said liner shell capsule (170), including after said rotation when said rotor (96) is stopped, said high-loft filter media (148) reducing re-entrainment of said separated contaminant during start-up at the beginning of the next rotation of said rotor (96), said liner shell capsule (170) with said high-loft filter media (148) therein being discarded upon servicing of said centrifuge (82), and replaced by another disposable liner shell capsule (170) with fresh high-loft filter media (148) therein.

12. Filtering system according to any one of the claims 5 to 11 wherein said centrifuge (82) has a rotor (96) centrifugally separating particulate contaminant from said working fluid by rotation of said rotor (96) about an axis (160), said

rotor (96) having a turbine (128) for causing rotation of said rotor (96) in response to a pressurized gas jet motive force, said turbine (128) having an inner ring (152) on said rotor (96), a plurality of vanes (132) extending radially outwardly to outer vane tips (154), and an outer ring (156) at said outer vane tips (154), said outer ring (156) blocking and containing deflected radially outward gas flow from said vanes (132) and confining said deflected gas flow to the radial gap between said inner and outer rings (152, 156),

preferably, wherein said rotor (96) is mounted in a housing (98) having first and second inlets (84, 150), and an outlet (92), said first inlet (84) being a fluid inlet admitting contaminant-laden fluid for said centrifugal separation of said contaminant upon rotation of said rotor (96), said second inlet (150) being a gas inlet admitting said pressurized motive force gas to cause rotation of said rotor (96), said outlet (92) being both a gas and fluid outlet exhausting both said fluid after said separation and said motive force gas after driving said rotor (96),

further preferably, wherein said rotor (96) has an inner cylindrical sidewall (102) with a hollow interior (104), and an outer cylindrical sidewall (106) spaced radially outwardly of said inner cylindrical sidewall (102) and defining a first annular space (108) therebetween, said housing (98) has a cylindrical sidewall (112) spaced radially outwardly of said rotor outer cylindrical sidewall (106) and defining a second annular space (114) therebetween, said rotor inner cylindrical sidewall (102) has a transfer passage (146) therethrough providing communication of said hollow interior (104) with said first annular space (108), said turbine (128) is in said second annular space (114), said rotor (96) has a base plate (110) with a drain passage (111) communicating with said first annular space (108), said housing (98) has a base plate (116) having a first port (84) communicating with said hollow interior (104) and providing said fluid inlet for admitting contaminant-laden fluid from said second outlet (56) of said cleanable filter (16) to said hollow interior (104) of said rotor inner cylindrical sidewall (102) for passing through said transfer passage (146) into said first annular space (108) for centrifugal separation upon said rotation, said housing base plate (116) has a second port (92) communicating with said drain passage (111) and said second annular space (114) and providing said housing outlet (92) exhausting said fluid from said first annular space (108) through said drain passage (111) and said gas from said second annular space (114).

13. Filtering system according to any one of the claims 5 to 12 wherein said centrifuge (82) comprises a rotor (96) mounted in a housing (98) for rotation

about an axis (100) for centrifugally separating particulate contaminant from said contaminant-laden working fluid, said rotor (96) having an inner cylindrical sidewall (102) with a hollow interior (104), and an outer cylindrical sidewall (106) spaced radially outwardly of said inner cylindrical sidewall (102) and defining a first annular space (108) therebetween, said housing (98) having a cylindrical sidewall (112) spaced radially outwardly of said rotor outer cylindrical sidewall (106) and defining a second annular space (114) therebetween, said rotor inner cylindrical sidewall (102) having a transfer passage (146) therethrough providing communication of said hollow interior (104) with said first annular space (108), said rotor (96) having a base plate (110) with a drain passage (111) communicating with said first annular space (108), said rotor (96) having a turbine (128) for causing rotation of said rotor (96) in response to a pressurized gas jet motive force, said housing (98) having a base plate (116) with first, second and third ports (84, 150, 92), said first port (84) communicating with said hollow interior (104) and being connected to said second outlet (56) of said cleanable filter (16) and providing a fluid inlet for admitting contaminant-laden fluid to said hollow interior (104) of said rotor inner cylindrical sidewall (102) for passing through said transfer passage (146) into said first annular space (108) for centrifugal separation, said second port (150) communicating with said second annular space (114) at said turbine (128) for admitting pressurized gas for rotating said rotor (96), said third port (92) communicating with said drain passage (111) and said second annular space (114) and exhausting both said fluid from said first annular space (108) through said drain passage (111) and said gas from said second annular space (114).

14. Filtering system according to any one of the claims 8 to 13 said system combining a cleanable filter (16) and a centrifuge (82) and transferring a contaminant storage function from said cleanable filter (16) to said centrifuge (82), said centrifuge (82) comprising a standpipe (180) circumscribing said inner cylindrical sidewall (102) and dividing said annular space (108) into an inner annular chamber (182) between said standpipe (180) and said inner cylindrical sidewall (102), and an outer annular chamber (184) between said standpipe (180) and said outer cylindrical sidewall (106),
preferably, wherein said rotor (96) has a base plate (110) extending between said inner and outer cylindrical sidewalls (102, 106), said rotor base plate (110) has a drain passage (111) communicating with said annular space (108) and effective upon stopping of said rotation to drain fluid therefrom, said standpipe (180) has

an upper end (186) at said transfer passage (146), and has a lower end (188) at said drain passage (111), and wherein said contaminant-laden fluid comprises contaminant-laden liquid in a gas stream, and such that during rotation, gas in said gas stream from said transfer passage (146) is vented through said inner annular chamber (182) to said drain passage (111), and contaminant-laden liquid from said transfer passage (146) is centrifically propelled into said outer annular chamber (184),

further preferably, comprising high-loft filter media (148) in said outer annular chamber (184) comprising a matrix of filter material of at least 75% void volume, said outer annular chamber (184) providing a storage container storing said contaminant and retaining said contaminant in said high-loft filter media (148), said high-loft filter media (148) retaining and storing said separated contaminant in said outer annular chamber (184), including after said rotation when said rotor (96) is stopped, said high-loft filter media (148) reducing re-entrainment of said separated contaminant during start-up at the beginning of the next rotation of said rotor (96).

15. Filtering system according to any one of the claims 1 to 14 wherein said cleansing fluid is air, said contaminant-laden fluid contains both liquid and air, and said motive force pressurized gas is air.

16. In a filtering system for filtering working fluid from a machine (12) where filter capacity is too low for a permanent filter yet flow rate is too high for a centrifuge, a combination employing the flow rate capability of a filter with the storage capacity capability of a centrifuge, comprising a cleanable filter (16) having a filter media element (30) for filtering said working fluid, said cleanable filter (16) having a first inlet (24) receiving working fluid from said machine (12), said cleanable filter (16) having a first outlet (26) returning working fluid to said machine (12), said cleanable filter (16) having a second inlet (52) receiving a cleaning fluid from a source of cleaning fluid, said cleanable filter (16) having a second outlet (56) exhausting said cleaning fluid, said filter media element (30) having a clean side (34) communicating with said first outlet (26) and said second inlet (52), said filter media element (30) having a dirty side (32) communicating with said first inlet (24) and said second outlet (56), said cleanable filter (16) having a first flowpath therethrough from said first inlet (24) through said filter media element (30) in one direction to said first outlet (26), said cleanable filter (16) having a second flowpath therethrough from said

second inlet (52) through said filter media element (30) in the opposite direction to said second outlet (56), said first and second flowpaths having common but opposite direction portions through said filter media element (30), said cleanable filter (16)having a filtering mode of operation with said second inlet (52) closed and said second outlet (56) closed and filtering fluid flow therethrough along said first flowpath, said cleanable filter (16) having a backwash mode of operation with said second inlet (52) open and said second outlet (56) open and cleaning fluid flowing therethrough along said second flowpath and backwashing contaminant-laden working fluid from said dirty side of said filter media element (30) to said second outlet (56), said centrifuge (82) having an inlet (84) connected to said second outlet (56) of said cleanable filter (16), said centrifuge (82) having a batch processing mode operative during said backwashing mode of said cleanable filter (16) and receiving said contaminant-laden working fluid from said second outlet (56) of said cleanable filter (16) and separating and storing contaminant,

preferably, wherein said cleanable filter (16) is a continuous flow filter in said filtering mode, and said centrifuge (82) is a non-continuous flow batch processor having a rotor (96) driven during said backwash mode of said cleanable filter (16) and separating contaminant, said rotor being nondriven during said filtering mode of said cleanable filter (16).

17. Combination according to claim 16 comprising a plurality of said cleanable filters (16) having respective said second outlets (56) connected in parallel to said inlet (84) of said centrifuge (82),

preferably, wherein said centrifuge (82) has a plurality of batch processing modes operating serially sequentially, one mode for each of said cleanable filters (16).

18. A method for filtering working fluid from a machine (12) comprising filtering said working fluid through a filter (16) having a filter media element (30) for filtering said working fluid, said filter (16) having a first inlet (24) receiving working fluid from said machine (12), said filter (16) having a first outlet (26) returning working fluid to said machine (12), said filter (16) having a second inlet (52), supplying cleaning fluid to said second inlet (52) from a source of cleaning fluid, said filter (16) having a second outlet (56), said filter media element (30) having a clean side (34) communicating with said first outlet (26) and said second inlet (52), said filter media element (30) having a dirty side (32)

communicating with said first inlet (24) and said second outlet (56), said filter (16) having a first flowpath therethrough from said first inlet (24) through said filter media element (30) in one direction to said first outlet (26), said filter (16) having a second flowpath therethrough from said second inlet (52) to said filter media element (30) in the opposite direction to said second outlet (56), said first and second flowpaths having common but opposite direction portions through said filter media element (30), exhausting said cleaning fluid and contaminant-laden working fluid from said second outlet (56), and separating contaminant from said contaminant-laden working fluid with a contaminant separator (82).

19. Method according to claim 18 comprising also storing said contaminant in said contaminant separator (82) and discharging said fluid from said contaminant separator (82) after separation of contaminant,
preferably, comprising circulating working fluid to said machine (12) through a circulation system, and discharging working fluid from said contaminant separator (82) to said circulation system,
further preferably, comprising providing a sump (14) in said circulation system containing working fluid for said machine (12), and discharging working fluid from said contaminant separator (82) to said sump (14).

20. Method according to claim 18 or 19 comprising providing said contaminant separator (82) as a batch processor and operating said contaminant separator (82) during said backwash mode of said filter (16) such that said batch processor receives said contaminant-laden working fluid from said second outlet (56) of said filter (16) and separates and stores contaminant and passes working fluid.

21. Method according to claim 20 comprising providing said filter (16) as a continuous flow filter in said filtering mode, and providing said batch processor as a non-continuous flow centrifuge, providing said centrifuge (82) with a rotor (96) and driving said rotor (96) during said backwash mode of said filter (16) to separate contaminants, and nondriving said rotor (96) during said filtering mode of said filter (16).

22. Method according to any one of the claims 18 to 20 comprising providing said contaminant separator (82) as a centrifuge having a rotor (96) separating contaminant from working fluid and having a storage container storing said contaminant.

23. Method according to claim 22 comprising driving said rotor (96) of said centrifuge (82) by a motive force, and providing pressurized air as each of said motive force and said cleaning fluid,
preferably, comprising providing a source of compressed air as (71) said source of cleaning fluid, and supplying said pressurized air from said source of compressed air (71) as both said motive force for said rotor (96) and said cleaning fluid for said filter (16),
further preferably, comprising controlling the supply of pressurized air from said source of compressed air to said second inlet (52) of said filter (16) and controlling the supply of pressurized air from said source of compressed air (71) to said rotor (96) of said centrifuge (82) such that said rotor (96) begins spinning prior to introduction of contaminant-laden working fluid to said inlet of said centrifuge (82) such that the centrifugal force of the already spinning rotor (96) creates a hollow central air core in said contaminant-laden working fluid allowing escape of air.

24. Method according to claim 22 or 23 comprising circulating working fluid to said machine (12) through a circulation system, and discharging working fluid from said contaminant separator (82) to said circulation system by gravity drain,
and/or, preferably, comprising circulating working fluid to said machine (12) through a circulation system, and discharging working fluid from said contaminant separator (82) to said circulation system by a delayed charge of pressurized air from said source of compressed air (71) pressurizing said centrifuge (82) following said separation.

25. Method according to any one of the claims 22 to 24 comprising reducing fluid turbulence in said centrifuge (82) during rotor speed gradients at start-up, trapping contaminant particles and reducing particle re-entrainment during rotor speed gradients,
preferably, comprising reducing fluid turbulence in said centrifuge (82) during rotor speed gradients at start-up, trapping contaminant particles and reducing particle re-entrainment during said rotor speed gradients by providing a second filter media element (148) in said storage container,
further preferably, comprising providing said rotor (96) with an annular chamber (108), and providing high-loft filter media (148) comprising a matrix of filter

material of at least 75% void volume as said second filter media element (148) in said annular chamber (108) in said rotor (96) providing said storage container.

26. A method for combining a cleanable filter (16) and a centrifuge (82) in a filtering system, comprising in combination providing a cleanable filter (16), providing a filter media element (30) in said cleanable filter (16) for filtering said working fluid, providing said cleanable filter (16) with a first inlet (24) receiving working fluid from a machine (12), providing said cleanable filter (16) with a first outlet (26) returning working fluid to said machine (12), providing said cleanable filter (16) with a second inlet (52) and supplying cleaning fluid to said second inlet (52) from a source of cleaning fluid, providing said cleanable filter (16) with a second outlet (56) exhausting said cleaning fluid, providing said filter media element (30) with a clean side (34) communicating with said first outlet (26) and said second inlet (52), providing said filter media element (30) with a dirty side (32) communicating with a said first inlet (24) and said second outlet (56), providing said cleanable filter (16) with a first flowpath therethrough from said first inlet (24) through said filter media element (30) in one direction to said first outlet (26), providing said cleanable filter (16) with a second flowpath therethrough from said second inlet (52) through said filter media element (30) in the opposite direction to said second outlet (56), providing said first and second flowpaths having common but opposite direction portions through said filter media element (30), providing said cleanable filter (16) with a filtering mode of operation with said second inlet (52) closed and said second outlet (56) closed and filtering fluid flow therethrough along said first flowpath, providing said cleanable filter (16) with a backwash mode of operation with said second inlet (52) open and said second outlet (56) open and said cleaning fluid flowing therethrough along said second flowpath and backwashing contaminant-laden working fluid from said dirty side (32) of said filter media element (30) to said second outlet (56), providing a centrifuge (82) having an inlet (84) and connecting said inlet (84) of said centrifuge (82) to said second outlet (56) of said cleanable filter (16), operating said centrifuge (82) preferably in a batch processing mode during said backwashing mode of said cleanable filter (16) and receiving said contaminant-laden working fluid from said second outlet (56) of said cleanable filter (16) and separating and storing contaminant,

preferably, wherein said method is applied for utilizing the flow rate capability of a filter (16) and the storage capacity capability of a centrifuge (82) in a combined filtering system for filtering working fluid from a machine (12) where

filter capacity is too low for a permanent filter yet flow rate is too high for a centrifuge,
and/or, optionally, wherein said method is applied for transferring a contaminant storage function from said cleanable filter (16) to said centrifuge (82).

27. Method according to claim 26 comprising providing said cleanable filter (16) as a continuous flow filter in said filtering mode, and providing said centrifuge (82) as a non-continuous flow batch processor having a rotor (96), driving said rotor (96) during said backwash mode of said cleanable filter (16) to separate contaminant, and nondriving said rotor (96) during said filtering mode of said cleanable filter (16),
preferably, comprising providing said centrifuge (82) with a housing (98) having a rotor (96) mounted for rotation therein about an axis (100), providing said rotor (96) with an inner cylindrical sidewall (102) with a hollow interior (104), and an outer cylindrical sidewall (106) spaced radially outwardly of said inner cylindrical sidewall (102) and defining an annular space (108) therebetween, providing said inner cylindrical sidewall (102) with a transfer passage (146) therethrough providing communication of said hollow interior (104) with said annular space (108), providing said housing (98) with an inlet (84) for admitting contaminant-laden fluid to said hollow interior (104) of said inner cylindrical sidewall (102) for passing through said transfer passage (146) into said annular space (108) for centrifugal separation upon said rotation, said annular space (108) providing a storage container storing said contaminant, providing said rotor (96) with a base plate (110) extending between said inner and outer cylindrical sidewalls (102, 106), providing said rotor base plate (110) with a drain passage (111) communicating with said annular space (108) and effective upon stopping of said rotation to drain fluid therefrom, performing said separating function during rotation of said rotor (96) and performing said draining function after rotation of said rotor (96) when said rotor (96) is stopped.

28. Method according to claim 27 comprising providing high-loft filter media (148) in said annular space (108) comprising a matrix of filter material of at least 75% void volume, said annular space (108) providing said storage container storing said contaminant and retaining said contaminant in said high-loft filter media (148), said high-loft filter media (148) retaining and storing said separated contaminant in said annular space (108), including after said rotation when said rotor (96) is stopped, said high-loft filter media (148) reducing re-entrainment of

said separated contaminant during start-up at the beginning of the next rotation of said rotor (96).

29. Method according to claim 27 comprising providing said rotor (96) outer cylindrical sidewall removably separable from said base plate (110), providing a disposable liner shell capsule (170) extending along and lining the interior of said outer cylindrical sidewall (106) and accumulating and containing contaminant, servicing said centrifuge (82) by removing said outer cylindrical sidewall (106) and then discarding said disposable liner shell capsule (170) with contained contaminant therein and then replacing same with another disposable liner shell capsule (170),
preferably, wherein said disposable liner shell capsule (170) defines said annular space (108) therein, and comprising providing high-loft filter media (148) in said disposable liner shell capsule (170) comprising a matrix of filter material of at least 75% void volume, said annular space (108) providing said storage container storing said contaminant and retaining said contaminant in said high-loft filter media (148), said high-loft filter media (148) retaining and storing said separated contaminant in said annular space (108), including after said rotation when said rotor (96) is stopped, said high-loft filter media (148) reducing re-entrainment of said separated contaminant during start-up at the beginning of the next rotation of said rotor (96), and servicing said centrifuge (82) by removing and discarding said disposable liner shell capsule (170) with said high-loft filter media (148) therein and replacing same by another disposable liner shell capsule (170) with fresh high-loft filter media (148) therein.

30. Method according to claim 27, providing a standpipe (180) circumscribing said inner cylindrical sidewall (102) and dividing said annular space (108) into an inner annular chamber (182) between said standpipe (180) and said inner cylindrical sidewall (102), and an outer annular chamber (184) between said standpipe (180) and said outer cylindrical sidewall (106), providing said standpipe (180) with an upper end (186) at said transfer passage (146), providing said standpipe (180) with a lower end (188) having one or more openings at said drain passage (111), said fluid containing contaminant-laden liquid in a gas stream, and during rotation, venting gas from said transfer passage (146) through said inner annular chamber (182) to said drain passage (111), and centrifically propelling contaminant-laden liquid from said transfer passage (146) into said outer annular chamber (184), and upon stopping of said rotation, draining liquid

from said outer annular chamber (184) through said one or more openings (190) at said lower end (188) of said standpipe (180) to said drain passage (111),
preferably, comprising providing high-loft filter media (148) in said outer annular chamber (184) comprising a matrix of filter material of at least 75% void volume, said outer annular chamber (184) providing said storage container storing said contaminant and retaining said contaminant in said high-loft filter media (148), said high-loft filter media (148) retaining and storing said separated contaminant in said outer annular chamber (184), including after said rotation when said rotor (96) is stopped, said high-loft filter media (148) reducing re-entrainment of said separated contaminant during start-up at the beginning of the next rotation of said rotor (96).

31. Method according to any one of the claims 26 to 30 comprising providing a plurality of said cleanable filters (16) having respective said second outlets (56), and connecting said second outlets (56) in parallel to said inlet (84) of said centrifuge (82),
preferably, comprising providing said centrifuge (82) with a plurality of batch processing modes, and operating said batch processing modes serially sequentially, one mode for each of said cleanable filters (16).

32. A centrifuge for separating particulate contaminant from a contaminant-laden fluid, comprising a housing (98) having a rotor (96) mounted for rotation therein about an axis (100), said rotor (96) having an inner cylindrical sidewall (102) with a hollow interior (104), and an outer cylindrical sidewall (106) spaced radially outwardly of said inner cylindrical sidewall (102) and defining an annular space (108) therebetween, said inner cylindrical sidewall (102) having a transfer passage (146) therethrough providing communication of said hollow interior (104) with said annular space (108).

33. Centrifuge according to claim 32, comprising high-loft filter media (148) in said annular space (108), said high-loft filter media (148) comprising a matrix of filter material of at least 75% void volume,
preferably, said housing (98) having an inlet (84) for admitting contaminant-laden fluid to said hollow interior (104) of said inner cylindrical sidewall (102) for passing through said transfer passage (146) into said annular space (108) for centrifugal separation upon said rotation,

further preferably, said annular space (108) providing a storage container storing said contaminant and particularly retaining said contaminant in said high-loft filter media (148).

34. Centrifuge according to claim 33 wherein said matrix of filter material of said high-loft filter media (148) is selected from the group consisting of: fibrous material; polyester; foam, including reticulated foam; spun bonded web; wire mesh, including stainless steel; and sintered material, including porous composites.

35. Centrifuge according to claim 33 or 34 wherein said rotor (96) has a base plate (110) extending between said inner and outer cylindrical sidewalls (102, 106), said rotor base plate (110) having a drain passage (111) communicating with said annular space (108) and effective upon stopping of said rotation to drain fluid therefrom,
preferably, wherein said centrifuge (82) is a batch processor performing said separating function during rotation of said rotor (96), and performing said draining function after rotation of said rotor (96) when said rotor (96) is stopped, wherein said high-loft filter media (148) retains and stores said separated contaminant in said annular space (108), including after said rotation when said rotor (96) is stopped, and wherein said high-loft filter media (148) reduces re-entrainment of said separated contaminant during start-up at the beginning of the next rotation of said rotor (96).

36. Centrifuge according to claim 35 wherein said rotor base plate (110) has a configured surface (160) facing said annular space (108) and gravitationally guiding drainage of fluid therefrom to said drain passage (111) upon said stopping of rotation,
preferably, wherein said configured surface (160) has an upper-height outer portion (162) adjacent said outer cylindrical sidewall (106), a lower pocket portion (164), and an intermediate-height inner portion (166) adjacent said inner cylindrical sidewall (102), said configured surface (160) being tapered radially inwardly and downwardly from said upper-height outer portion (162) to said lower pocket portion (164) and then upwardly to said intermediate-height inner portion (166), said upper-height outer portion (162) having a height higher than said intermediate-height inner portion (166), said intermediate-height inner portion (166) having a height greater than said lower pocket portion (164), said

drain passage (111) being at said intermediate-height inner portion (166), such that separated contaminant not retained by said high-loft filter media (148) is collected in said lower pocket portion (164), and fluid above said collected contaminant in said lower pocket portion (164) drains to said drain passage (111),

further preferably, wherein said rotor (96) rotates about a central shaft (120), and wherein said drain passage (111) is between said central shaft (120) and said rotor base plate (110).

37. Centrifuge according to any one of the claims 33 to 36, said outer cylindrical sidewall (106) being removably separable from said base plate (110), said rotor (96) further having a disposable liner shell capsule (170) extending along and lining the interior of said outer cylindrical sidewall (106) and accumulating and containing contaminant in said annular space (108), such that said centrifuge (82) may be serviced by removing said outer cylindrical sidewall (106) and then discarding said disposable liner shell capsule (170) with contained contaminant therein and replacing same with another disposable liner shell capsule (170), said disposable liner shell capsule (170) defining said annular space (108) therein, high-loft filter media (148) in said disposable liner shell capsule (170) comprising a matrix of filter material of at least 75% void volume, said annular space (108) providing said storage container storing said contaminant and retaining said contaminant in said high-loft filter media (148), said high-loft filter media (148) retaining and storing said separated contaminant in said annular space (108), including after said rotation when said rotor (96) is stopped, said high-loft filter media (148) reducing re-entrainment of said separated contaminant during start-up at the beginning of the next rotation of said rotor (96), said disposable liner shell capsule (170) with said high-loft filter media (148) therein being discarded upon servicing of said centrifuge (82), and replaced by another disposable liner shell capsule (170) with fresh high-loft filter media (148) therein,

preferably, wherein said liner shell capsule (170) further includes a base portion (174) extending along and lining the interior of said rotor base plate (110), said drain passage (111) being uncovered by said base portion (174) of said liner shell capsule (170),

and/or, preferably, wherein said outer cylindrical sidewall (106) is a bell-shaped member, and said liner shell capsule (170) is complementally bell-shaped along the interior thereof.

38. Centrifuge according to claim 32, wherein said contaminant-laden fluid comprises contaminant-laden liquid in a gas stream, said housing (98) having an inlet (84) for admitting said contaminant-laden liquid in said gas stream to said hollow interior (104) of said inner cylindrical sidewall (102) for passing through said transfer passage (146) into said annular space (108) for centrifugal separation upon said rotation, said rotor (96) having a drain passage (111) communicating with said annular space (108) and effective upon stopping of said rotation to drain fluid therefrom, a standpipe (180) circumscribing said inner cylindrical sidewall (102) and dividing said annular space (108) into an inner annular chamber (182) between said standpipe (180) and said inner cylindrical sidewall (102), and an outer annular chamber (184) between said standpipe (180) and said outer cylindrical sidewall (106), said standpipe (180) having an upper end (186) at said transfer passage (146), and having a lower end (188) at said drain passage (111), such that during rotation, gas from said transfer passage (146) is vented through said inner annular chamber (182) to said drain passage (111), and contaminant-laden liquid from said transfer passage (146) is centrifically propelled into said outer annular chamber (184),
preferably, wherein said standpipe (180) has an upper reach at said upper end (186) at a level vertically below said transfer passage (146),
and/or, preferably, wherein said standpipe (180) has one or more openings (190) at said lower end (188) draining fluid therethrough from said outer annular chamber (184) to said drain passage (111) upon said stopping of said rotation,
further preferably, wherein said standpipe (180) is perforated with a plurality of holes at said lower end (188) covered with a ring of filter material.

39. Centrifuge according to claim 38 wherein said rotor (96) has a base plate (110) extending between said inner and outer cylindrical walls (102, 106), said rotor base plate (110) has a configured surface (160) facing said annular space (108) and gravitationally guiding drainage of liquid therefrom to said drain passage (111) upon said stopping of rotation, and wherein said standpipe (180) at said lower end (188) is mounted to said rotor base plate (110) at said configured surface (160),
preferably, wherein said configured surface (160) has an upper-height outer portion (162) adjacent said outer cylindrical sidewall (106), a lower pocket portion (164), and an intermediate-height inner portion (166) adjacent said inner cylindrical sidewall (102), said configured surface (160) being tapered radially

inwardly and downwardly from said upper-height outer portion (162) to said lower pocket portion (164) and then upwardly to said intermediate-height inner portion (166), said upper-height outer portion (162) having a height higher than said intermediate-height inner portion (166), said intermediate-height inner portion (166) having a height greater than said lower pocket portion (164), said drain passage (111) being at said intermediate-height inner portion (166), such that separated contaminant is collected in said lower pocket portion (164), and liquid above said collected contaminant in said lower pocket portion (164) drains to said drain passage (111),
further preferably, wherein said rotor (96) rotates about a central shaft (120), and wherein said drain passage (111) is between said central shaft (120) and said rotor base plate (110).

40. Centrifuge according to claim 38 wherein said outer annular chamber (184) has high-loft filter media (148) therein comprising a matrix of filter material of at least 75% void volume, and wherein said inner annular chamber (182) is left open without filter material therein to facilitate high volumetric flow of said gas therethrough to escape from said rotor (96) quickly and with low pressure drop.

41. Centrifuge according to any one of the claims 38 to 40 further comprising in combination a turbine (128) for causing rotation of said rotor (96) in response to a pressurized gas jet motive force, said turbine (128) having an inner ring (152) on said rotor (96), a plurality of vanes (132) extending radially outwardly to outer vane tips (154), and an outer ring (156) at said outer vane tips (154), said outer ring (156) containing and blocking deflected radially outward gas flow from said vanes (132) and confining said deflected gas flow to the radial gap (158) between said inner and outer rings (152, 156),
preferably, wherein said gas of said pressurized gas jet motive force and said gas of said gas stream are the same.

42. A centrifuge having a rotor (96) mounted in a housing (98) for rotation about an axis (100) for centrifugally separating particulate contaminant from a contaminant-laden fluid, said rotor (96) having an inner cylindrical sidewall (102) with a hollow interior (104), and an outer cylindrical sidewall (106) spaced radially outwardly of said inner cylindrical sidewall (102) and defining a first annular space (108) therebetween, said housing (98) having a cylindrical sidewall (112) spaced radially outwardly of said rotor outer cylindrical sidewall

(106) and defining a second annular space (114) therebetween, said rotor inner cylindrical sidewall (102) having a transfer passage (146) therethrough providing communication of said hollow interior (104) with said first annular space (108), said rotor (96) having a base plate (110) extending between said inner and outer cylindrical sidewalls (102, 106) and having a drain passage (111) communicating with said first annular space (108), said rotor (96) having a turbine (128) in said second annular space (114) for causing rotation of said rotor (96), said housing (98) having a base plate (110) with first, second and third ports (84, 150, 92), said first port (84) communicating with said hollow interior (104) of said rotor inner cylindrical sidewall (102) and providing an inlet for contaminant-laden fluid for admitting contaminant-laden fluid to said hollow interior (104) of said rotor inner cylindrical sidewall (102) for passing through said transfer passage (146) into said first annular space (108) for centrifugal separation upon said rotation, said second port (150) providing a pressurized gas jet motive force inlet communicating with said second annular space (114) at said turbine (128) for causing rotation of said rotor (96), said third port (92) communicating with said drain passage (111) and said second annular space (114) and providing an outlet exhausting both said fluid from said first annular space (108) through said drain passage (111) and said gas from said second annular space (114),
preferably, wherein said contaminant-laden fluid contains both liquid and gas,
and/or, preferably, wherein said gas of said motive force gas and said gas of said contaminant-laden fluid are the same.

43. A centrifuge having a rotor (96) centrifugally separating particulate contaminant from a contaminant-laden fluid by rotation of said rotor (96) about an axis (100), a turbine (128) for causing rotation of said rotor (96) in response to a pressurized gas jet motive force,
preferably said turbine (128) having an inner ring (152) on said rotor (96), a plurality of vanes (132) extending radially outwardly to outer vane tips (154), and an outer ring (156) at said outer vane tips (154), said outer ring (156) containing and blocking deflected radially outward gas flow from said vanes (132) and confining said deflected gas flow to the radial gap between said inner and outer rings (152, 156),
further preferably, wherein said rotor (96) is mounted in a housing (98) having first and second inlets (84, 150), and an outlet (92), said first inlet (84) being a fluid inlet admitting contaminant-laden fluid for said centrifugal separation of said contaminant upon said rotation of said rotor (96), said second inlet (150)

being a gas inlet admitting said pressurized motive force gas to cause rotation of said rotor (96), said outlet (92) being both a gas and fluid outlet exhausting both said fluid after said separation and said motive force gas,
further preferably, wherein said rotor (96) has an inner cylindrical sidewall (102) with a hollow interior (104), and an outer cylindrical sidewall (106) spaced radially outwardly of said inner cylindrical sidewall (102) and defining a first annular space (108) therebetween, said housing (98) has a cylindrical sidewall (112) spaced radially outwardly of said rotor outer cylindrical sidewall (106) and defining a second annular space (114) therebetween, said rotor inner cylindrical sidewall (102) has a transfer passage (146) therethrough providing communication of said hollow interior (104) with said first annular space (108), said turbine (128) is in said second annular space (114), said rotor (96) has a base plate (110) with a drain passage (111) communicating with said first annular space (108), said housing (98) has a base plate (116) with an inlet port (84) communicating with said hollow interior (104) of said inner cylindrical sidewall (102) of said rotor (96) and providing said fluid inlet for admitting contaminant-laden fluid to said hollow interior (104) of said rotor inner cylindrical sidewall (102) for passing through said transfer passage (146) into said first annular space (108) for centrifugal separation upon said rotation, said housing base plate (116) having an outlet port (92) communicating with said drain passage (111) and said second annular space (114) and providing said outlet exhausting said fluid from said first annular space (108) through said drain passage (111) and said gas from said second annular space (114),
further preferably, wherein said housing base plate (116) has a second inlet port (150) communicating with said turbine (128) in said second annular space (114) and providing said gas inlet.

44. Centrifuge according to claim 43 wherein said contaminant-laden fluid comprises contaminant-laden liquid in a gas stream.

45. Centrifuge according to claim 43 or 44 comprising a standpipe (180) circumscribing said inner cylindrical sidewall (102) and dividing said first annular space (108) into an inner annular chamber (182) between said standpipe (180) and said rotor inner cylindrical sidewall (102), and an outer annular chamber (184) between said standpipe (180) and said rotor outer cylindrical sidewall (106), said standpipe (180) having an upper end (186) at said transfer passage (146), and having a lower end (188) at said drain passage (111), such that during

rotation, gas from said gas stream from said transfer passage (146) is vented through said inner annular chamber (182) to said drain passage (111), and contaminant-laden liquid from said transfer passage (146) is centrifically propelled into said outer annular chamber (184).

46. Centrifuge according to claim 45 wherein said outer annular chamber (184) has high-loft filter media (148) therein comprising a matrix of filter material of at least 75% void volume, and wherein said inner annular chamber (182) and said second annular space (114) are left open without filter material therein.